

Attorney Docket No. TS02-420

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application.

- 1 1. (Previously presented) A method for obtaining values for optical constants n and
2 k for a layer on a substrate comprising:
 - 3 (a) providing a substrate with an organic or inorganic layer formed thereon;
 - 4 (b) performing a spectral ellipsometer measurement and a broadband
5 spectrometer measurement of said organic or inorganic layer in an integrated optical
6 measurement system;
 - 7 (c) independent of said performing, determining a thickness for said organic
8 or inorganic layer using an independent optical thickness measurement component
9 based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and
 - 10 (d) determining said values for said optical constants n and k for said organic
11 or inorganic layer based on said thickness, the spectral ellipsometer measurement, the
12 broadband spectrometer measurement, and modeling information, wherein n represents
13 index of refraction and k represents extraction coefficient.
- 1 2. (Original) The method of claim 1 wherein said organic or inorganic layer has a
2 thickness in the range of about 300 to 10000 Angstroms.
- 1 3. (Cancelled)
- 1 4. (Cancelled)
- 1 5. (Previously presented) The method of claim 1 wherein the integrated optical
2 measurement systems is an Opti-Probe series measurement system from Therna-
3 Wave or a system with equivalent capability.

Attorney Docket No. TS02-420

1 6. (Previously presented) The method of claim 1 wherein the independent optical
2 thickness measurement component provides experimental data in the form of beam
3 profiles that are matched to modeling data in a processor to arrive at a best fit of
4 experimental data to modeling data.

1 7. (Original) The method of claim 1 wherein step (d) involves a Critical Point model
2 otherwise known as a harmonic oscillator approximation.

1 8. (Previously presented) The method of claim 1 wherein said thickness data is
2 combined with measurement data from said spectral ellipsometer and broadband
3 spectrometer measurements to provide an experimental data output for said organic or
4 inorganic layer.

1 9. (Original) The method of claim 8 wherein said experimental data output is fitted
2 to modeling data to provide a best fit of experimental data to modeling data.

1 10. (Previously presented) The method of claim 9 wherein said best fit of
2 experimental data to modeling data provides said values for said optical constants n
3 and k for said organic or inorganic layer.

1 11. (Previously presented) The method of claim 1 wherein said organic or inorganic
2 layer is a 248 nm photoresist, a 193 nm photoresist, or an anti-reflective layer.

1 12. (Currently Amended) A method for obtaining n and k values for corresponding
2 optical constants n and k for a top layer in a bilayer film stack on a substrate comprising:
3 (a) providing a substrate having a stack of layers comprised of a top
4 photoresist layer and a bottom layer formed thereon;
5 (b) performing a spectral ellipsometer measurement and a broadband
6 spectrometer measurement of said top photoresist layer in an integrated optical
7 measurement system;

Attorney Docket No. TS02-420

8 (c) inputting an input thickness value and input n and k values for said bottom
9 layer into a program used to ~~make~~ calculate said n and k values ~~calculations~~;

10 (d) independent of said performing, determining a thickness for said top
11 photoresist layer using an independent optical thickness measurement component
12 based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and

13 (e) independent of said performing, determining said ~~values for said optical~~
14 ~~constants~~ n and k values for said top photoresist layer based on data that includes the
15 thickness of said top photoresist layer, the spectral ellipsometer measurement, the
16 broadband spectrometer measurement, and modeling information.

1 13. (Original) The method of claim 12 wherein said top photoresist layer has a
2 thickness in the range of about 1000 to 10000 Angstroms.

1 14. (Currently Amended) The method of claim 12 wherein the thickness as well as
2 the input n and k values of said bottom layer were determined prior to forming said top
3 photoresist layer by a process comprising:

4 (1) forming said bottom layer on said substrate;

5 (2) performing a spectral ellipsometer measurement and a broadband
6 spectrometer measurement of said bottom layer in an integrated optical measurement
7 system;

8 (3) determining a thickness for said bottom layer; and

9 (4) determining said ~~values for said optical constants~~ input n and k values for
10 said bottom layer based on the thickness of the bottom layer, spectral ellipsometer
11 measurement of the bottom layer, broadband spectrometer measurement of the bottom
12 layer, and modeling information.

1 15. (Previously presented) The method of claim 14 wherein the independent optical
2 thickness measurement component is used to determine the thickness bottom layer.

1 16. (Previously presented) The method of claim 14 wherein the independent optical
2 thickness measurement component is based on Beam Profile Reflectometry or Beam
3 Profile Ellipsometry.

Attorney Docket No. TS02-420

1 17. (Previously presented) The method of claim 14 wherein the integrated optical
2 measurement system is an Opti-Probe series measurement system for Thermo-Wave
3 or a system with equivalent capability.

1 18. (Original) The method of claim 12 wherein step (e) involves a Critical Point
2 model otherwise known as a harmonic oscillator approximation.

1 19. (Previously presented) The method of claim 12 wherein the thickness of the top
2 photoresist layer is combined with measurement data from said [[SE]] spectral
3 ellipsometer and broadband spectrometer measurements to provide an experimental
4 data output for said top photoresist layer.

1 20. (Original) The method of claim 19 wherein said experimental data output is fitted
2 to modeling data to provide a best fit of experimental data to modeling data.

1 21. (Previously presented) The method of claim 20 wherein said best fit of
2 experimental data to modeling data provides said values for said optical constants n
3 and k for said top photoresist layer.

1 22. (Previously presented) The method of claim 12 wherein said top photoresist
2 layer is 248 nm photoresist or a 193 nm photoresist and the bottom layer is an organic
3 or inorganic anti-reflective layer.

1 23. (Currently Amended). A method for obtaining n and k values for corresponding
2 optical constants n and k for a top layer in a trilayer film stack on a substrate
3 comprising:

4 (a) providing a substrate having a stack of layers comprised of a bottom
5 inorganic layer, a middle organic anti-reflective coating layer, and a top photoresist layer
6 formed thereon;

Attorney Docket No. TS02-420

7 (b) performing a special spectral ellipsometer measurement and a broadband
8 spectrometer measurement of said top photoresist layer in an integrated optical
9 measurement system;

10 (c) inputting a thickness and input n and k values for said bottom inorganic
11 layer and said middle anti-reflective coating layer into a program used to ~~make~~ calculate
12 said n and k values calculations;

13 (d) independent of said performing, determining a thickness for said top
14 photoresist layer using an independent optical thickness measurement component
15 based on Beam Profile Reflectometry or Beam Profile Ellipsometry; and

16 (e) determining said n and k values for said top photoresist layer based on
17 data that includes the thickness of said top photoresist layer, the spectral ellipsometer
18 measurement, the broadband spectrometer measurement, and modeling information.

1 24. (Cancelled)

1 25. (Previously presented) The method of claim 23 wherein the thickness for the top
2 photoresist layer is combined with measurement data from said spectral ellipsometer
3 and broadband spectrometer measurements to provide an experimental data output for
4 said top photoresist layer.

1 26. (Original) The method of claim 25 wherein said experimental data output is fitted
2 to modeling data to provide a best fit of experimental data to modeling data.

1 27. (Currently Amended) The method of claim 26 wherein said best fit of
2 experimental data to modeling data provides ~~said values for said optical constants n~~
3 and k values for said top photoresist layer.

1 28. (Original) The method of claim 23 wherein said top photoresist layer is a 248 nm
2 or 193 nm photoresist and the bottom inorganic layer is comprised of silicon nitride or
3 silicon oxynitride.